

# Charge Li-ion batteries from ac line voltage

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Li-ion battery chargers must apply constant current when the battery charge is low and constant voltage when the battery charge is high. To avoid battery damage, the tolerance on the applied voltage must be less than 1%. The charger in Figure 1 complies with these requirements.

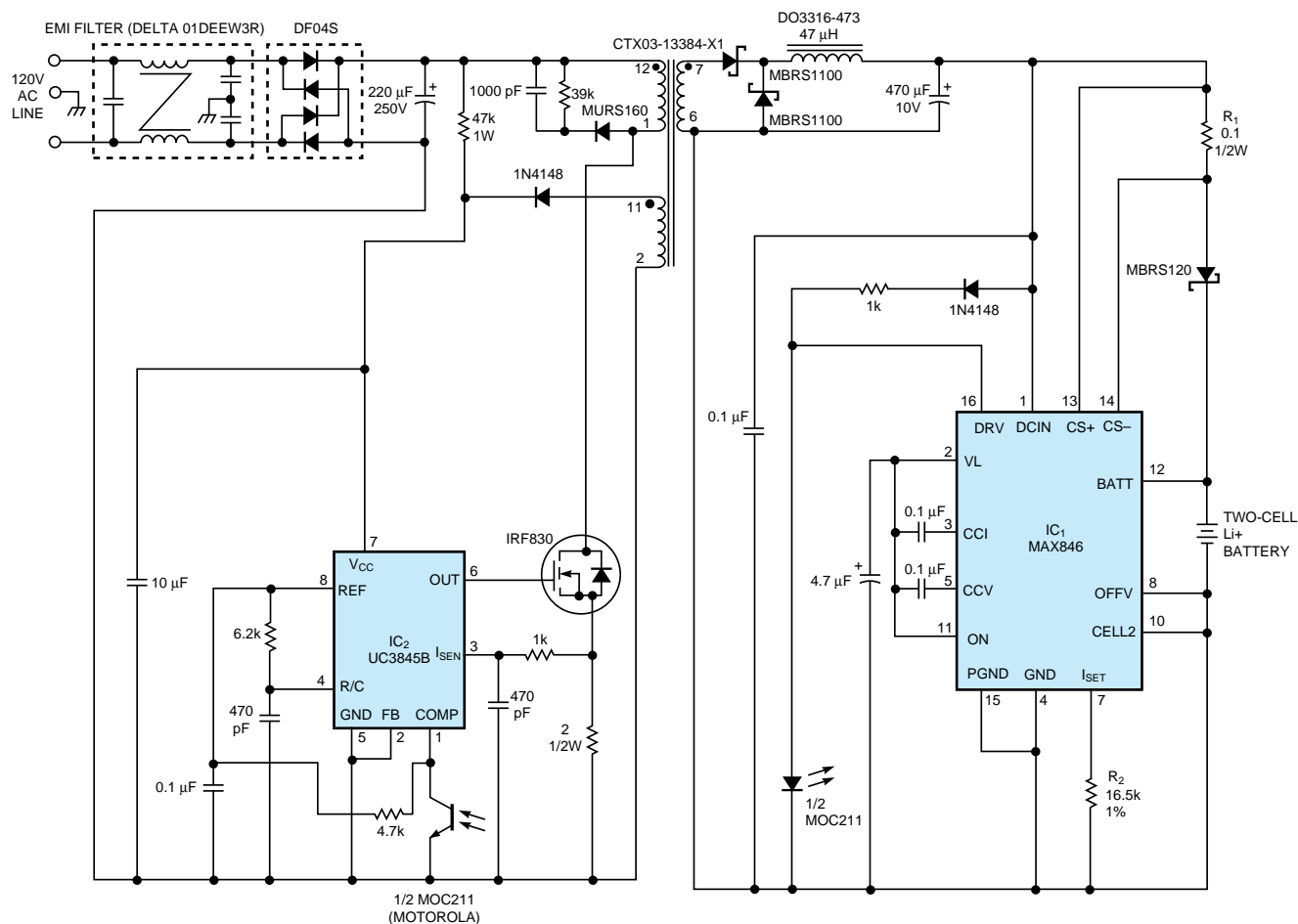
The circuit converts energy from 120V ac to a regulated voltage or current as necessary to charge two Li-ion cells in series. IC<sub>1</sub>, a popular controller for offline power-supply applications, operates as a forward converter, producing an isolated, half-wave-rectified battery voltage or current from the full-wave-rec-

tified line voltage. This converter operates at 250 kHz and handles ac inputs from 90 to 135V.

IC<sub>2</sub> is a chemistry-independent battery charger. Though designed to drive an external transistor, in this case, it drives the MOC211 optoisolator to control IC<sub>1</sub> across the isolation barrier. IC<sub>2</sub>'s internal circuitry sets the battery voltage to 8.4V-0.5%. The 0.1Ω current-sense resistor, R<sub>1</sub>, and I<sub>SET</sub> resistor, R<sub>2</sub>, set the battery current to 1A-2%. (DI #2161)

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**FIGURE 1**



A high-voltage controller, IC<sub>1</sub>, transformer, and chemistry-independent battery charger, IC<sub>2</sub>, charge two-cell Li-ion batteries directly from the ac line.